Siboga-Expeditie
VIII

THE STYLASTERINA OF THE SIBOGA EXPEDITION

BY

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Victoria University of Manchester

With three plates

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INTRODUCTION.

The association of the genus *Millepora* with the family Stylasteridae in one Order of the Hydrozoa called the Hydrocorallina is not justified by recent investigations of their anatomy. Apart from the fact that *Millepora* agrees with the Stylasteridae in forming a continuous coenosteum of calcium carbonate and exhibits dimorphism of the zooids, it has no characters in common with them. On the other hand in the structure of the nematocysts, the structure of the dactylozooids, the general characters of the coenosteum and its relations to the soft parts *Millepora* shows no close relationship to the Stylasteridae. Finally the discovery made by one of us [1]) that the male and female sexual cells of *Millepora* are borne by free-swimming medusae of a very distinct and definite type necessitates the separation of this genus from the other Hydrozoa and the establishment of a new sub-order for its reception.

It appears to us that to express more accurately the relations of the old group Hydrocorallinae, *Millepora* should be placed in an Order Milleporina situated in our system next to the Hydromedusae, whilst the family Stylasteridae should be placed in an Order Stylasterina situated near to the Trachymedusae.

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1) S. J. Hickson. Quart Journ. Micr. Sci. 1891 and Proc. Roy. Soc. 1899.

STYLASTERINA.

All the recent genera of this order whose anatomy has been adequately investigated are closely related and may justly be included in one family the *Stylasteridae*. The only genus that is at all divergent is *Steganopora* described in this monograph, but as our knowledge of its anatomy is still very incomplete it may provisionnally be included in the same family.

The characters of the order may be summarised as follows:

Order STYLASTERINA.

Hydrophytum arborescent, perforated to a considerable depth by the gastrozooids, dactylozooids and nutritive canals of the living colony. Gastropores usually provided with a conical calcareous projection at the base called the "style". Nematocysts of two kinds, large and small but quite distinct in character from the nematocysts of *Millepora*. Dactylozooids devoid of tentacles, with solid scalariform endoderm. Gonophores enclosed in ampullae. Female gonads provided with a special nutritive organ the trophodisc. Ova large and centrolecithal. Embryos escape from the ampullae in the form of solid planulae (sterrulae).

The description given above is modified and abbreviated from that given by MOSELEY. A few comments are necessary to explain the changes that have been made. In *Millepora* the living parts of the coral are confined to a very thin lamina at the surface, and to this there is no exception. In the Stylasterina on the other hand the living nutritive canals usually penetrate to the axis of the smaller branches and it is only the main stem and some of the older branches that show any dead supporting coral. The only exception to this general rule is to be found in *Sporadopora*, in which genus, according to MOSELEY, "only a comparatively thin layer on the surface of the coral is occupied by living soft structures". A reference to MOSELEY's description and figure shows however that this layer must be relatively much thicker than it is in *Millepora* and the difference between the Stylasterina and Milleporina in this respect is a very real one.

The structure of the nematocysts is an important one in the consideration of the affinities of Coelenterata, because they are organs which show very little variation within the limits of a species.

In *Millepora* the large nematocysts are oval or almost spherical in shape, and the long thread has a broad belt of thorns in the middle. In all the Stylasterina in which the large nematocysts have been found, their shape is much narrower and might be described as spindle-shaped; and, according to MOSELEY, the belt of thorns is at the base and not in the middle of the thread. As regards the smaller kind of nematocysts, the three-spined type so characteristic of *Millepora* has not been found in any Stylasterid.

The solid scalariform endoderm of the dactylozooids is another very distinctive feature of the family. In all the specimens of the genus *Millepora* that have been examined the dactylozooids show a cavity extending from the apex to the base and the endoderm cells are very similar to the endoderm cells lining the coenosarcal canals. The scalariform tissue is clearly a much more differentiated tissue than this and taken with other characters suggests that the Stylasterina are a more specialised group.

The general characters of the gonophores of Stylasterina form another important point of difference from *Millepora*. The discovery of ampullae in a variety of *Millepora* called *M. murrayi* by QUELCH [1]) suggested that the gonophores might be similar to those of Stylaster; but the discovery by one of us [2]) that the ampullae bear medusae proved the error of this supposition. Whether the gonophores are or are not adelocodonic gonophores, as suggested by MOSELEY, may be a matter open still to discussion but if they are they show features very different from those of any other adelocodonic gonophores in the Hydrozoa. The specialisation of the trophodisc in the female gonophore, whether we regard it as a modified manubrium or not, to purvey nourishment to the growing eggs is a definite and distinct character of the Stylasterina.

Family STYLASTERIDAE

with the characters of the order.

Of the 14 genera of recent Stylasterids, *Stylaster*, *Errina*, *Cryptohelia*, *Conopora* and *Distichopora* are represented in the collection. The genera *Allopora*, *Astylus*, *Sporadopora*, *Phalangopora*, *Pliobothrus*, *Labiopora* and *Spinipora* are not represented in the collection. We consider that the genus *Stenohelia* is not distinct and should be merged with *Stylaster* and that the genus *Lepidopora* (Pourtales) as pointed out by MOSELEY, is not distinct and should be merged with *Errina*. The genus *Phalangopora* (Kirkpatrick) [3]) differs from *Errina* in the absence of a style in the gastropore but in other respects comes very close to it. A new genus *Steganopora* is constituted for a fragment of a coral of very remarkable structure.

Of the five genera represented in the collection *Stylaster* and *Distichopora* occur in shallow water. *Stylaster* extends from quite shallow water on the reefs into deep or very deep

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1) J. J. QUELCH, Challenger Reports, Vol. XVI.
2) l. c. p. 1.
3) R. KIRKPATRICK, Ann. de Mag. Nat. Hist. March 1887.

water. *Distichopora* is confined to shallow water. The genera *Errina*, *Cryptohelia* and *Conopora* are confined to deep or very deep water, (204—1633 metres).

The genus *Distichopora* is undoubtedly very common in the shallow waters of the Malay Archipelago and is probably represented by only one variable species [1]). Only one specimen however was included in the collection sent to us and this presented no features of special interest.

The genus *Stylaster* however is represented by a large number of specimens from depths ranging from 0—1633 metres, and it is in this genus that we have found the greatest difficulty in assigning specific names to the specimens.

Stylaster is one of those genera of zoophytes which, like *Millepora*, *Tubipora*, *Madrepora* etc. have a wide geographical distribution in the shallow warm waters of the tropical belt. It exhibits a great degree of variability in its form and habit due, probably, to the development of considerable powers of adaptation to the variable conditions as regards strength of current, light, food supply and other features of the environment in shallow tropical waters. To divide the specimens of this genus into specific groups becomes increasingly difficult as our knowledge extends.

The consideration of the fact that the individual colonies of these genera usually occur in great numbers and that there is nothing, so far as we are aware, to prevent constant cross fertilisation in shallow water, renders it probable that the shallow water specimens of each of these genera throughout the world represent only one true species. It has been shown that in the case of *Millepora* [2]) and *Tubipora* [3]) at least the anatomical structure of the colonies supports this conclusion.

Stylaster however differs from some of the other genera of tropical zoophytes in the fact that it extends from very shallow into very deep water and it is interesting to note that the difficulty of arranging the deep sea specimens into specific groups is much less than in the case of the shallow water specimens. It would not be surprising if it were ultimately proved that in the case of *Stylaster* isolation in deep sea localities has led to the differentiation of distinct species, in much the same way as isolation upon islands has led to the differentiation of species of terrestrial animals. In considering the systematic arrangement of any genus of zoophytes we must endeavour to distinguish between characters that are most probably modified by the immediate conditions of the environment and characters which are more stereotyped or fixed. In the genus *Stylaster* for example the shape assumed by the hydrophytum as a whole, its colour, its delicacy or robustness, the position of the calicles, the general texture of the surface etc. appear to be characters which are profoundly modified by the conditions of the environment. On the other hand the position of the ampullae, the character of the styles, the structure of the cyclosystems and many of the characters of the soft parts are probably less liable to modification by the direct action of the conditions of the environment. In the present state of knowledge and in the absence of any record of experimental work on the growth of corals the conclusions we reach may not prove to be satisfactory but we feel that it is only in

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1) S. J. Hickson, Proc. Roy. Dublin, Soc. VII, 5.
2) S. J. Hickson, On the species of the genus Millepora. Proc. Zool. Soc. 1898.
3) S. J. Hickson, A. naturalist in N. Celebes 1889, p. 129.

the attempt to work upon these lines that there can be any hope of reducing the present chaos of our system. In this connexion, reference may be made to a character of great interest.

In several genera the main stem is tubular in form instead of being solid, a character which is sometimes spoken of as fistulose. We find such a condition in *Stylaster amphiheloides*, *Errina labiata*, *Conopora tenuis*, and it is obviously comparable with the condition in the Zoantharian forms *Neohelia* [1]), *Amphihelia* and others and in the Alcyonarian genus *Solenocaulon*. In many cases it is found that the cavity of the stem contains an Annelid worm (*Nereis* sp.?) or a Crustacean (*Alpheus*). It is improbable that the epizoite actively hollows out the stem. It is more probable that the stem of the young colony grows round and encloses the epizoite in the manner of a coral gall. In any case, however, the fistulose character of the stem cannot be regarded as a useful one for generic or even specific distinction.

In the following description of specimens and species certain measurements are given indicative of the size and form of the colony. It is necessary to explain the method and terminology of these measurements.

The exact size of the colony can only in a few rare cases be determined. Very few specimens that were obtained are perfect. They are nearly always more or less broken by natural forces in situ, by the dredge, or in transit to the systematist. Sometimes the injury is slight, and the measurements can be estimated with considerable accuracy, but frequently the specimens are broken into many fragments and in such cases the measurements can only be guessed to be within certain wide limits.

We have endeavoured in all cases to estimate the greatest distance from the base of attachment to the tip of the most distant branch taken in a line approximately perpendicular to the base of attachment and this we have termed the height of the colony. We have also estimated the width of the colony by the measurement of the line at right angles to the line of height stretching between the apices of branches at the greatest distance apart. We have also measured the diameter of the stem at a point just above the disc of attachment and as a guide to one feature of the ramification the diameter of the main stem at a point quite close to the attachment of the primary branch.

In a very large number of Stylasterids the method of branching is flabellate, that is to say the branches arise in one plane and give the colony a general fan-like shape. In some of these the cyclosystems are all or nearly all situated on one side of the flabellum, possibly it is on the side facing the direction of the prevailing current that brings them food. Whatever the cause may be however, it is useful to employ a term to designate the surface on which the cyclosystems occur and that on which they are generally absent. The former therefore we call the "anterior" surface and the latter the "posterior" surface. In like manner the surfaces of each branch, which are in the same plane as the plane of the flabellum, are called "anterior and posterior sides" respectively. The other surfaces are called the "lateral sides".

The terms used in the descriptions of corals are unfortunately not uniform and a general revision of them is necessary. In the present memoir, we use the word Hydrophytum to signify

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1) E. M. Pratt. Willey's Zoological Results, Pl. V.

the whole colony hard and soft parts together, the word Coenosteum to signify the hard coral skeleton only. The word Coenosarc refers to the system of canals and superficial ectoderm connecting the zooids of the colony, the words Gastrozooid and Dactylozooid refer to the soft parts of the zooids only. With reference to the word "Coenenchym" frequently used by writers on Madreporaria, Hydrocorallina and Alcyonaria a few remarks here seem appropriate.

The word seems to have been introduced by MILNE EDWARDS and HAIME and the following sentence from their chapter of general considerations on the organisation of corals explains clearly the sense in which they used it [1]). "Il existe par conséquent là un tissu commun ou *coenenchyme* qui précède l'existence des individus et qui joue un rôle considérable dans la constitution du polypier, ainsi que nous le verrons par la suite".

The word is used in a similar sense by KÖLLIKER [2]) who speaks of de LACAZE DUTHIERS discovery that the axis of the precious coral is formed by "einer Verkalkung der inneren Lagen des Coenenchyms" and by many other writers.

Originally then the word referred to soft tissues only. Writers on Alcyonarians at the present day use it for extra-thecal parts of a colony, i. e. hard spicules and soft tissues together, exclusive of the solidified axis. Writers on Madreporaria have however come to use the word in a different sense altogether so that we read in a recent paper on Madreporaria. "By universal acceptation coenenchyme is the calcareous deposit originating from the coenosarc" [3]). This is neither historically nor philologically correct. The sense in which the word Coenenchym should be used and is used by us in this memoir is as the expression for the superficial hard and soft parts beyond the limits of the zooid pores.

Stylaster Gray.

The genus may be defined as follows:

Coenosteum arborescent usually flabelliform. Pores in regular cyclosystems only. Style in gastropores and dactylopores. Dactylozooids can be only partially retracted. Ampullae usually prominent in both male and female stocks. Male gonophore with an endodermic spadix, four to five gonophores in each male ampulla.

This definition differs from that of MOSELEY in several respects. The difficulty which he originally pointed out of separating *Stylaster* from *Allopora* has not been overcome. Speaking generally the colonies of *Allopora* are more robust in habit and do not show such prominent male ampullae at the surface as are usually found in *Stylaster*. The male and female gonophores of the two genera are very similar in detail but, from the limited number of forms investigated at present, it appears probable that in the species of *Stylaster* there are more gonophores (4—5) in each male ampulla than there are in *Allopora*. And as the male gonophores are more deeply seated in *Allopora* than in *Stylaster* the tubular spout of the testis is longer and more definite in the former than in the latter genus. MOSELEY thought that a difference might

1) MILNE EDWARDS and HAIME. Hist. Nat. des Coralliaires. t. 1, p. 29.
2) A. KÖLLIKER. Icones Histiol. p. 117.
3) J. E. DUERDEN. Mem. Nat. Acad. Sci- VIII, 1902.

be found in the number of tentacles of the gastrozooid, giving 12 as the number in *Allopora* and 8 in *Stylaster*; but the number of tentacles on the gastrozooids is much too variable for diagnostic purposes. In *S. gracilis*[1]) 12 tentacles have been found and we have found in *S. filogranus* 4,5, 6 or 7 tentacles.

As regards the characters mentioned by MOSELEY in these words "a strong tendency towards the development of the cyclosystems on the lateral margins of the branches only. Cyclosystems arising from one another by alternate gemmation", we may say that the alternate gemmation is only pronounced in those forms arranged in the groups *A.* and *D.* in which the cyclosystems are confined to the lateral sides of the branches, or to one surface only of the flabellum. In the other groups the alternate gemmation is not nearly so conspicuous, even if, in some cases, it may be rightly said to occur at all.

However for the present we think it is advisable to keep the species attributed to *Allopora* distinct, fully recognising the close relationship they have with this large and very variable genus.

This is the most abundant and widely spread genus of the family. No less than 29 species have been described. They may be arranged according to a suggestion of STUDER[2]) as follows:

A. Cyclosystems on lateral sides of the branches only.

S. flabelliformis Milne Edwards and Haime.
S. gracilis Milne Edwards and Haime.
S. amphiheloides Saville Kent.
S. punctatus Pourtales.
S. filogranus Pourtales.
S. asper Saville Kent.
S. densicaulis Moseley.
S. infundibulifera Lamarck.
S. bellus Dana.
S. tenuis Verrill.
S. eximius Duchassaing and Michelotti.
S. laevis Studer.
S. verrucosus Studer.
S. bilobatus sp. n.
S. multiplex sp. n.

B. Cyclosystems on lateral sides of branches and a few on the surfaces.

S. roseus Milne Edwards and Haime.
S. sanguineus Milne Edwards and Haime.
S. gemmascens Milne Edwards and Haime.
S. erubescens Pourtales.
S. elegans Verrill.
S. pulcher Dall.

C. Cyclosystems evenly distributed over the surfaces of the branches.

S. granulosus Milne Edwards and Haime.
S. stellulatus Stewart.

D. Cyclosystems on the anterior surface of the branches only.

S. complanatus Pourtales.
S. obliquus Studer.
S. virginis Moseley.
S. tiliatus sp. n.
S. minimus sp. n.
S. umbonatus sp. n.

1) S. J. HICKSON. Proc. Roy. Dublin Soc. VII, 5.
2) TH. STUDER. Monatsber. der K. Akad. Berlin 1877.

The following species are shallow water or littoral:

S. filogranus. *S. sanguineus.* *S. eximius**.
S. bellus. *S. stellulatus.*

The following have a wider range:

S. flabelliformis	0—150 fms.	*S. erubescens*	120—520 fms.
S. gracilis	0—520 „	*S. roseus*	0—340 „
S. punctatus	9—315 „	*S. complanatus*	100—458 „

Those that have been found only at one depth are:

S. obliquus	90 fms.	*S. densicaulis*	600 fms.
S. virginis	200—300 „	*S. laevis*	90—650 „
S. gemmascens	530 „ and great depths.	*S. (Stenohelia) profunda*	450—600 „
S. verrucosus	597 „		

The depths from which the other species were obtained is not recorded.

The different species of *Stylaster* found by the Siboga, occured at the following depths.

S. eximius	0—118 M.	*S. bilobatus*	204—520 M.
S. bellus	469—1089 „	*S. multiplex*	450—1633 „
S. densicaulis	469—1633 „	*S. minimus*	1089 „
S. gemmascens	564 „	*S. tiliatus*	275 „
S. amphiheloides	469—1633 „	*S. umbonatus*	1901 „
S. virginis	469 „		

Geographically the species have been found in:

Pacific Ocean waters.
S. flabelliformis.
S. gracilis.
S. bellus.
S. laevis.
S. verrucosus.
S. stellulatus.
S. pulcher.

Atlantic Ocean.
S. roseus.
S. densicaulis.
S. complanatus.
S. virginis.
S. madeirensis.
S. profundus.
S. gemmascens.
S. amphiheloides.
S. asper.

S. eximius, *S. sanguineus*, *S. erubescens* have been found in both Pacific and Atlantic waters.
S. rosso-americanus Brandt, has not been described or figured.

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*) A specimen was placed by MOSELEY in this species, which came from 400 fms. This is the only exception to the species being restricted to shallow water.

1. *Stylaster eximius* Duchassaing and Michelotti.

S. elegans Duchassaing and Michelotti. Les Coral. des Antilles. Supplement p. 68, Pl. IX. fig. 4. 1864. Name of species preoccupied, renamed as follows:
S. eximius Saville Kent. Proc. Zool. Soc. Lond. April 4th 1871.
S. duchassaingii Pourtales. Deep-Sea Coral. 1871, p. 35, Pl. VI, fig. 1 and 2. 43 fms, Tortugas.

The greatest depth at which the specimens which are grouped round the species *S. eximius*, in the Siboga collection, have been found is 118 M. (65½ fms.). The least depth at which, in this collection, an old or new distinct species has been found is 204 M. *(S. bilobatus)*. It is especially interesting to note that this species recorded at 204, 469 and 520 M. varies, to not a small extent, with these localities and the specimen that comes from 204 M. is the least specialised and most closely related to *S. eximius*. The large species *S. eximius* has been divided into a number of facies.

a. *S. eximius* fac. *altus*. Plate I, figs. 1—3.

Stat. 164.	1°42'.5 S., 130°47'.5 E. W. of New Guinea.	22 M. 2 pieces.
Stat. 144.	S. of Halmaheira.	45 M. Several small pieces.
Stat. 282.	8°25'.2 S., 127°18'.4 E. E. of Timor.	27—54 M. or from reef. 1 fragment.
Stat. 303.	Between Timor and Samau Ils.	Up to 36 M. Several pieces.

This is a tall, subflabellate coral with non-anastomosing branches (Fig. 1). The height is about 100 mm., the diameter of the main stem at its base 3 mm., the axis at the base of the terminal branches from 0,8 to 1 mm. The colour is white, but one branch among the many pieces from Stat. 303, was faintly suffused with pink in certain regions, which included some side branches, about the middle of its length. The surface of the hydrophytum, including the ampullae is smooth, but fine longitudinal striations caused by rows of vertical canals of the coenosarc can be seen under magnification on the younger branches. The bracket-like cyclosystems (Fig. 2—3) are small, being from 0,7 to 0,8 mm. in transverse diameter and projecting 0,4 mm. from the surface. Alternate cyclosystems, that is to say adjacent ones on the same side of the stem, are about 1—6 mm. apart.

The method of growth appears to be influenced considerably by the production of ampullae. A great production of gonads seems to retard growth in length; the thickness of the branches increases considerably; the cyclosystems seem to become relatively smaller and less important, they project less, that is to say, are less bracket-like and are often joined (cf. *S. bellus*). When this is the case, fresh dactylozooids may be formed so as to complete the cycle (Fig. 3). Colonies are often found in a transition stage, but one old, dark-coloured specimen from Stat. 282 has almost entirely complete cylosystems, with joined septa, and these cyclosystems, in the older parts of the stem, lie flat on the surface and gradually become quite overgrown by the coenenchym. On the younger branches the lower, abaxial edge of the cyclosystem projects slightly.

The specimen drawn and described by Duchassaing and Michelotti probably belongs

to this facies. There are a few ampullae, but the method of growth is active. POURTALES figures and gives a very short description of another small specimen of this variety.

Facies *Altus*. Hydrophytum irregularly flabellate; surface smooth; may be 100 mm. in height; cyclosystems small, bracket-like, not projecting far; in old specimens, the edges of the septa are joined and the cycle of dactylozooids completed.

b. *S. eximius* fac. *dentatus*. Plate I, figs 4—6.

Stat. 144. N. of Salomakiëe Isl. 45 M. Several pieces.
Stat. 274. 5° 28′.2 S., 134° 53′.9 E. N. E. Aru Isl. „ 57 M. 1 Ex.
Stat. 310. 8° 30′ S., 119° 7′.5 E. E. of Sumbawa. 73 M. One colony.

This facies also is subflabellate with non-anastomosing branches. The longitudinal striations are well marked, otherwise the surface is smooth. The specimen from Stat. 310 (Fig. 4) is very pale pink, those from 144 and 274 are yellowish white. The latter are young colonies (Fig. 6) of 55 mm. in height, the former, an older one, is 70 mm. in height and 3 mm. in diameter at the base of the main stem. The peculiarity of this variety is the breadth of the cyclosystems (Fig. 5), which are often 1 mm. in diameter and their close proximity to one another, two successive cyclosystems on one side of the stem being about 1,2 mm. apart or even less. When young the cyclosystems project 0,5 mm. from the surface, which gives a very dentate appearance to the branches. They are gradually worn down with age. The cyclosystems embrace the stem, that is to say the two ends of the semicircles of dactylozooids are carried further round the stem than in the previous facies; as a result of this, complete cycles of dactylozooids are never formed. The ampullae occur all over the surface of the branches; the specimen from Stat. 310 is much distended by them. In this case the surface of the ampullae is smooth, in the other specimens that have gonads the surface exhibits small knobs or protuberances.

Facies *Dentatus*. Hydrophytum irregularly flabellate; surface smooth; up to 70 mm. in height; branches dentate in appearance owing to the shape of the cyclosystems which are bracket-like, large, project far and are closely placed; complete cyclosystems are never formed.

c. *S. eximius* fac. *irregularis*.

Stat. 310. 8° 30′ S., 119° 7′.5 E. of Sumbawa. 73 M. Several pieces.

This facies forms an intermediate stage between the facies *dentatus* and *minor*, the next to be described. *S. eximius* fac. *irregularis* is very irregularly flabellate, with non-anastomosing branches and is about 45 mm. in height. The diameter of the thickest part of the stem is 2 mm. that of the axis at the base of the terminal branches 0,8 mm. The colour is white or purplish pink; the surface smooth, but exhibits delicate longitudinal striations. The bracket-like cyclosystems are large and except in the older branches, embrace half the stem, that is to say, if they grew in pairs, the edges of the cyclosystems would touch. The cyclosystems are about 0,8 mm. in transverse diameter and project 0,55 mm. from the stem. Successive cyclosystems

on one side of the stem are about 1,6 mm. apart. The surface of the ampullae is generally rather uneven.

Facies *Irregularis*. Hydrophytum very irregularly flabellate; about 45 mm. in height, surface smooth; cyclosystems bracket-like, not so broad and further apart than in the preceding facies, to which it is otherwise closely related.

d. *S. eximius* fac. *minor*. Plate I, figs. 7 and 8.

Stat. 80. 2° 25′ S., 117° 43 E. Strait of Makassar. 34 M. Numerous pieces and small fragments. Pink.
Stat. 117. 1° 0′.5 N., 112° 56′ E. N. of Celebes. 80 M. 2 pieces and 2 small fragments. Pink.
Stat. 125. Off Siau, one of the Sangir Ils. up to 27 M. 3 pieces. White.
Stat. 133. Talaut Ils. up to 36 M. 4 fragments. Pink.
Stat. 144. S. of Halmaheira. 45 M. Several small fragments. White and various shades of pink.
Stat. 154. 0° 7′.2 N., 130° 25′.5 E. N.W. of Waigeu Isl. (N. of New Guinea). 83—59 M. 4 fragments. White.
Stat. 166. 2° 28′.5 S., 131° 3′.3 E. Between New Guinea and Ceram. 118 M. Several small fragments. White.
Stat. 310. 8° 30′ S., 119° 7′.5 E. E. of Sumbawa. 73 M. 1 Ex. Pink.
Stat. 315. N. of Sumbawa. Up to 36 M. 1 Ex. Pink.

This facies varies to a considerable extent in its method of growth. It forms a more or less profusely branched flabellum and may either be very delicate or fairly stout. The branches do not anastomose, but in one or two instances a branch has met some other object and spread out over it in the form of a thin lamina and the surface of this lamina may in its turn, give rise to branches (Fig. 7). The height probably does not exceed 60 mm. and is often much less. The diameter at the base of the main stem is from 2 to 3 mm., that of the axis at the base of the terminal branch varies from 0,4 to 1 mm. The branches zigzag in their course, especially the younger ones. The colour is variable, it may be orange pink, blue pink or white; when pink, the edges of the cyclosystems are often of a much deeper colour than the rest of the coral. The surface of the white specimens is longitudinally striated; in those that are pink the rows of vertical canals (which form the lines) are more irregularly placed, especially on the younger branches, where they form no lines at all. Otherwise the surface is either smooth, or may bear a few short, blunt spines. The bracket-like cyclosystems (Fig. 8) grow far round the stem, which is often small compared with the size of the cyclosystems. Their transverse diameter is about 0,8 mm. and they project 0,4 mm. Successive cyclosystems on one side of the stem are from 1,6 mm. to 2,4 mm. apart; they are usually fairly near together when ampullae are actively formed. The ampullae (Fig. 8 amp.) are generally covered with blunt spines, especially when there are spines upon the stem. In size and method of growth this facies is allied to the varieties *dentatus* and *irregularis*, but the cyclosystems closely resemble those on the most delicate branches of the facies *altus*.

Facies *Minor*. Hydrophytum flabellate; younger branches zigzag; surface smooth or with a few blunt spines; not exceeding 60 mm. in height, very variable in thickness; cyclosystems bracket-like, often large in comparison to the diameter of the stem.

2. *Stylaster bellus* Dana.

Allopora bella Dana. Zoophytes, p. 696. Pl. LX, Fig. 6 and 6*a*. Paumotu Archipelago.
Cyclopora bella Verril. Proc. Essex Institute. Vol. V, 1866—1867. Communications p. 38.

Stat. 95. 5°43′.5 N., 119°40′ E. Off Sulu Ils. 522 M. 3 specimens, one dry.
Stat. 156. 0°29′.2 S., 130° 5′.3 E. Off N.W. off New Guinea 469 M. 3 young specimens.
Stat. 150. 0° 6′ N., 129° 7′.2 E. Djilolo Passage. 1089 M. 1 young specimen.
These two last stations are close together, though the depth differs greatly.

The largest specimens are those in spirit from Stat. 95, one is about 110 mm. wide by 65 mm. in height and this piece is fairly intact. The diameter of the stem where it is broken off at the base is 12 mm., the diameter of the axis of the terminal branches at their bases about 2,5 mm. The cyclosystems are about 1,2 mm. The ampullae appear, at first, close to the cyclosystems, later they spread all over the branches.

The chief difference between *Cyclopora bella* and the specimens of the Siboga collection is (see Verrill) that the septa are joined together at their inner edges, to form a ring, in the former, while this is the exception, rather than the rule in the latter (see Dana Pl. LX, fig. 6*a*). We do not regard this as important, as the fusion of the inner edges of the septa often occurs in old colonies of other species and not in young ones, or at least not in the younger branches of young colonies.

3. *Stylaster densicaulis* Moseley.

Moseley. Challenger Reports. Zoology. Vol. II. p. 57. Pl. I, fig. 5. Off Rio de La Plata. 600 fms.

Stat. 156. 0°29′.2 S., 130° 5′.3 E. N.W. of New Guinea. 469 M. 1 Ex.
Stat. 177. 2°24′.5 S., 129°38′.5 E. N. of Ceram. 1300—1633 M. 1 Ex.

The type specimens of this species were obtained by the Challenger in 600 fathoms off the mouth of the Rio de La Plata in S. America. The two specimens from the Siboga collection, which we refer to the same species, were found in closely situated stations in the Malay Archipelago, one with a depth of 469 M. and the other 1300—1633 metres. If we regard this as a deep sea species, the fact that it has only been found in such widely separated localities as off the La Plata and off New Guinea is not an exceptional fact in the distribution of deep sea corals.

The largest colony, that from Stat. 177, is fairly intact and is about 45 mm. in height and breadth. The branches have the stems compressed in a plane at right angles to the plane of the flabellum, even more markedly than in Moseley's specimens. Sometimes the branch rises up into quite a sharp ridge; one branch is 5,7 mm. by 2 mm. in diameter. The base of the main stem is 6,2 mm. by 5 mm. but in this case the longest diameter is in the plane of the flabellum. The main stem is hollow. The cyclosystems are from 1 mm. to 1,2 mm. in diameter.

4. *Stylaster gemmascens* Milne Edwards & Haime.

Milne Edwards et Haime. Histoire naturelle des Coralliaires, Vol. II, p. 130. Indian Sea.
P. M. Duncan. Trans. Zool. Soc. pt. 2, Vol. VIII, p. 332, Pl. XLIX, fig. 1—6, 8—10 and 13—15. North Atlantic. 530 fms.

G. O. Sars. At great depths in the Foldenfjord, Norway. Bidrag til Kundskaben om Dyrelivet paa vore Havbanker. Forh. i Videnskabs Selskabet i Christiania, 1872, p. 115.

Stat. 97. 5°48′.7 N., 119°49′.6 E. Off Sulu Isl. 564 M. 1 Ex.

The only specimen of this widely distributed species that was dredged by the Siboga, is 50 mm. in height; the base of it was broken off, but apparently not far from the base of attachment. The width of the colony is about 25 mm., the diameter of the main stem 5 mm. and many of the short abruptly ending branches as much as 3,5 mm. Most of the cyclosystems are large and prominent, being from 1,6 × 0,8 mm. to 1 × 0,8 mm. They are formed by alternate gemmation (though this is sometimes rather irregular), but owing to the great growth of the coenenchym they are displaced in such a way that, on old branches they occur more or less irregularly, in two rows, on one surface, which may therefore be called "anterior", and rarely or spasmodically on the other, the "posterior" surface. The colour is a pale yellowish pink.

5. *Stylaster amphiheloides* Kent.

Saville Kent. Proc. Zool. Soc. 1871, p. 277, Pl. XXIV, fig. 1, 1*a*, *b* and *c*. Cape of Good Hope.

Stat. 97.	5°48′.7 N., 119°49.6 E. Sulu Ils.	564 M.	1 Ex.
Stat. 150.	0° 6′ N., 129° 7′.2 E. Djilolo Passage.	1089 M.	2 Ex.
Stat. 156.	0°29.2 N., 130° 5′.3 E. N.W. of New Guinea	469 M.	4 Ex.
Stat. 177.	2°24′.5 S., 129°38′.5 E. N. of Ceram.	1633 M.	2 pieces.
Stat. ?	label lost.		1 Ex.

The largest complete specimen, was 40 mm. in height, 35 mm. in breadth. The cyclosystems are from 1,5 × 0,7 mm. to 0,8 × 0,6 mm. in diameter.

The Siboga specimens have been compared with the type specimen in the British Museum from the Cape of Good Hope and they prove to be identical. Unfortunately Saville Kent does not give the depth at which his material was found. This species is in superficial characters curiously like the genus *Conopora*, the coenosteum being both fistulose and coalescent, and neither are flabellate in growth. A polychaet worm was found in the cavity of the main stem and as mentioned above was probably responsible for its peculiar formation. *Conopora* differs however from this and all the species of *Stylaster* in the absence of styles from both gastropores and dactylopores.

6. *Stylaster virginis* Lindström.

Cryptohelia virginis Lindström. K. Sv. Vet. Acad. Hand. N° 6, Bd. XIV, p. 15, Pl. II, Fig. 24. Off Salt Isl. Danish W. Indies. 200—320 fms.

Stat. 156. 0°29′.2 S., 130°5′.3 E. N.W. little of New Guinea. 469 M. 1 Ex. dry.

A small dry specimen has very much the same characters as those described and figured by Lindström for his species *Cryptohelia virginis* from the West Indies. We agree with Moseley in considering that the species should be placed in the genus *Stylaster*, as it differs markedly

from all species of *Cryptohelia* in the presence of a style in the gastropores. Moreover the character of the lid in *S. virginis* is different from that of *Cryptohelia* in being developed later. The lid is also smaller and irregular. The dactylozooids do not atrophy on the side of the lid, as in *Cryptohelia*, the cyclosystems being complete The cyclosystems vary very much in size, being from 1,6 × 0,8 mm. to 0,8 × 0,6 mm. in diameter.

7. *Stylaster bilobatus* sp. n. Plate I, figs. 9 and 10.

Stat. 156. 0° 29'.2 S., 130° 5'.3 E. N.W. of New Guinea. 469 M. Several small pieces, pink.
Stat. 251. 5° 28'.4 S., 132° 0'.2 E. Kei Ils. 204 M. 1 piece, white.
Stat. 297. 10° 39' S., 123° 40' E. Between Timor and Rotti Isl. 520 M. 1 young, white piece, 3 old, yellowish pink pieces, from 2 different colonies.

This species is flabellate and the branches do not anastomose (Fig. 9). The highest piece is 40 mm. and the broadest about 35 mm. Probably these measurements are not very much exceeded in the complete colony. The base of the thickest stem is 2 mm. in diameter. The colour is pale pink, almost white at the tips of the branches. Three evidently very old specimens from Stat. 297 were a dull, dirty-looking yellowish pink. The surface of the coral is scattered over with a few small blunt spines (Fig. 10); these are most developed in the old specimens. The cyclosystems are borne in a row on the two sides of the branches. They are bracket-like, but they are peculiar in having the sides of the bracket very much developed, while the abaxial side is very short, so that the cyclosystem looks like a pair of fan-shaped leaves, standing face to face. The cyclosystem is 0,7 mm. across transversely, by 1 mm. axial-abaxially and the cyclosystems on either side of the stem are 2 mm. apart.

The ampullae occur on both surfaces of the flabellum, always close to the cyclosystems.

Fac. *Alba*.

The two small white specimens from Stat. 251 and 297 seem to form a distinct facies. Besides the difference in colour, the branches are not so zigzag in their growth and the cyclosystems are larger and more solidly built. The largest cyclosystem measures 1 mm. by 1,1 mm. The differences however are not sufficient to constitute a distinct species.

This species may be defined:

Hydrophytum subflabellate, with bilobed, bracket-like cyclosystems.

Stylaster sp.?

Stat. 59. 10° 22'.7 S., 123° 16'.5 E. S.W. Off Timor 390 M. 1 'dead' colony.

This specimen is a much worn 'dead' colony. It is 26 mm. in height. The colour is white: the surface is longitudinally striated. The cyclosystems are bracket-like and borne in a row on each side of the branch. There is an ampulla on the surface of one branch.

This coral probably belongs to the species *S. bilobatus*, but the cyclosystems are too much worn to identify it with certainty.

8. *Stylaster multiplex* sp. n. Plate I, figs. 11 and 12.

Stat. 94. 5° 11'.2 N., 119° 35'.4 E. Sulu Ils. 450 M. 1 colony.
Stat. 177 (?). 2° 24'.5 S., 129° 38'.5 E. N. of Ceram. 1633 M. Several fragments.

The branches of this species are flabellate, but they are closely set one above the other, as is well shown by the very complete specimen obtained from Stat. 94 (Fig. 11). None of the branches anastomose. The height of the colony is 35 mm. the breadth about 40 mm. the diameter of the base of the stem, before it spreads out to attach itself to the substratum, 4 mm. The young branches are very zigzag in their course. The colour is a yellowish white, the surface smooth except for dotted, irregular longitudinal striations. The cyclosystems are slightly inclined towards one surface. *S. multiplex* is a transition stage between those species that have a complete cyclosystem (i. e. with no dactylozooids atrophied) turned to the side, such as *S. bella*, and those like *S. tiliatus* which have the cyclosystems on one surface only. For further discussion of this point see p. 17. In *S. multiplex* the cyclosystems are about 1,5 by 0,8 mm. diameter and two successive cyclosystems on the same side of the stem are 2,8 mm. apart. The gastropore is deep, the septa wide. The ampullae are developed in ones, twos, threes, or fours, close to a cyclosystem on the anterior or posterior surface of the flabellum.

This species may be defined:

Hydrophytum subflabellate; cyclosystems complete, slightly inclined towards one surface; gastropore deep.

9. *Stylaster minimus* sp. n. Plate II, figs. 13 and 14.

Stat. 150. 0° 6' N., 129° 7'.2 E. Djilolo Passage. 1089 M. One small fragment.

Only one very small fragment of this delicate deep sea coral was found. So far as can be observed in a piece of such small size it is regularly flabellate and the branches do not anastomose. The height of this fragment is about 10 mm., the diameter of the thickest part of the stem 1 mm. The colour is white. The surface appears to be quite smooth in spirit, but when it has been calcined it is seen to be slightly rough. The cyclosystems are all turned towards one surface of the flabellum; their edges are slightly crenate and they are 1 mm. by 0,8 mm. in diameter. The gastropore is fairly deep, but is not curved down the stem; the gastrostyle is therefore visible from the exterior, though it is not placed at the centre of the base of the gastropore but further down towards the base of the stem. The septa are wedge-shaped; the interseptal spaces are narrow. The cyclosystems are 1—4 mm. apart. A branch arises in the axil of each cyclosystem. No ampullae are visible.

This species closely resembles *S. tiliatus* in external characters (except for the difference in size) and *Stylaster (Stenohelia) profundus*, but may be readily distinguished from both by the comparative shallowness of the gastropore (cp. Moseley l. c. Plate XII, fig. 4). *S. minimus* is still more delicate than the type specimens of *S. profundus* in the British Museum.

This species may be defined:

Hydrophytum flabellate (or subflabellate?) delicate; surface smooth; cyclosystems all directed towards one surface; gastropore not very deep or curved far down the stem.

10. *Stylaster tiliatus* sp. n. Plate II, fig. 15.

Stat. 105. 6° 8′ N., 121° 19′ E. Sulu Ils. 275 M. 1 Ex. and fragments.

A fine specimen of this species was obtained, one of the few that showed the base of attachment. The branches are flabellate, but are arranged more or less in tiers, so that they often overlap each other. The main stem (before it spreads out at the base) is 12 mm. in diameter, but this immediately divides into six stout branches which measure about 3,5 mm. at the base. Two main branches are anastomosed, but this seems to be an exception; the finer branches show no anastomoses. The colony is 50 mm. high and about 90 mm. broad. In spirit specimens the surface of the coral appears smooth, but when calcined, there appear delicate, irregular longitudinal ridges and very fine scattered pores, with a few larger ones between them. The minute pores are the same as the dotted striations found in other species of Stylaster, that is to say coenenchym pores. The larger pores probably contained batteries of nematocysts similar to those described by Moseley in *Astylus* at the outer edge of the septa and in *Cryptohelia* both there and on the lid. The colour is yellowish white. The cyclosystems closely resemble those of Stenohelia, their openings all face one way and the gastropore is very deep and curved, with the style at the bottom, lying parallel to the axis of the branch; but there is a distinct, well developed style in the dactylopore, while in *Stenohelia* it is absent or very rudimentary. The Cyclosystems are more or less round in shape with a diameter of about 1,2 mm. and about 2 mm. apart; they are only slightly raised above the surface of the coral. Owing to the great growth of the coenenchym of the older branches, the cyclosystems lie on the upper surface, instead of jutting out on each side alternately. There is no external evidence of gonads. In one or two instances cyclosystems have been converted by a parasitic Cirrhipede into large globular masses 2 mm. in diameter.

This species may be defined:

Hydrophytum sub-flabellate, substantial; surface of corallum smooth; cyclosystems all directed towards one surface, gastropore very deep and curved down the stem.

11. *Stylaster umbonatus* sp. n. Plate II, figs. 16 and 17.

Stat. 119. 1° 33′.5 N., 124° 41′ E. N.E. of Celebes. 1901 M. Two pieces, one terminal, the other basal.

This deep sea species forms a delicate flabellum, with occasionally anastomosing branches. Its most marked peculiarity is that the surface is covered with large blunt spines (Fig. 17), which are oval in section, their long diameter (from 0,2 to 0,4 mm.) lying lengthwise to the branch. On the younger branches these spines occur on the sides only; they are also longer in proportion to their breadth. Longitudinal ridges also appear on the younger branches only. The height and breadth of the colony are both about 30 mm.; the base of the main stem is 2 mm. in diameter, the stem at the base of the terminal branches 0,6 mm. The colour is yellowish white. As in *S. tiliatus*, the cyclosystems all face towards one surface of the flabellum, the gastropore is deep and curves down the stem and there is a distinct style in the dactylopore as well as at the bottom of the gastropore. The cyclosystems are oval in shape, often more or

less distorted; the edge is more raised above the surface of the coral than in *S. tiliatus*. The diameter of the cyclosystem is 1 by 0,8 mm. The septa are very thick, the space between them narrow. The ampullae appear first on the posterior surface of the flabellum, one below each cyclosystem; later they are formed on the anterior surface or sides of the branches, but always in connexion with a cyclosystem. The surface of the ampullae is very irregular.

This species may be defined:

Hydrophytum flabellate; surface covered with large blunt spines; cyclosystems directed towards one surface; gastropore deep and curved down the stem.

At first sight *S. tiliatus* and *S. umbonatus*, owing to the peculiar position of their cyclosystems and the shape of the gastropore, appear to belong to a different genus to the other species of *Stylaster*. But in *S. multiplex* and *S. minimus* we have intermediate forms connecting these with the ordinary types of *Stylaster*. In the former *S. multiplex*, the cyclosystems are partially turned towards one surface of the flabellum and in the latter, *S. minimus*, although the cyclosystems face towards one surface only, the gastropores are not very deep and curved, as in *S. tiliatus*. These two characteristics cannot then be depended upon for generic distinctions.

The genus *Stenohelia* was defined by Moseley in the following terms: "Corallum delicate, branching, flabelliform; pores in regular cyclosystems only. Cyclosystems all turned towards one surface of the flabellum. Dactylopores without a style or with a very rudimentary one. Gastropore very deep and curved, so as to tubulate in all but the older branches, the entire lengths of the axes of the branches, with small styles seated at the bottoms of those tubes and directed parallel to the axes of the branches at right angles to those of the mouths of the cyclosystems". If we are right in concluding that the shape and position of the cyclosystems as they are here described (which description also applies exactly to *S. tiliatus* and *S. umbonatus*) are not good characters for generic distinction, then the only character that divides the genus *Stenohelia* from *Stylaster* is that the dactylopore in the former is either without a style or with a very rudimentary one. The small size of *Stenohelia profunda* must have made it difficult to ascertain this point with certainty. *S. umbonatus* is a larger and *S. tiliatus* a very much larger species and these both show a distinct style in the dactylopore, which can in neither case be called rudimentary. It seems therefore that there is not sufficient reason for keeping separate a genus *Stenohelia*, and so the new species *S. tiliatus* and *S. umbonatus* have been included in the large and variable genus *Stylaster* and according to us the only two species of *Stenohelia*, *S. madierensis* Kent and *S. profunda* Moseley, must also be added to it. Johnston, who first described the species *S. madierensis* placed it in the genus *Stylaster*: it was afterwards redescribed by Saville Kent.

Errina Gray.

The genus *Errina* may be defined as follows:

Coenosteum arborescent, irregularly flabelliform; gastropores and dactylopores separate, not in cyclosystems, regularly or irregularly arranged; style in gastropore, no style in dactylopore; dactylopore on a nariform projection; gastropore with or without a scale (the raised margin of the pore or fused dactylopore projections). Gastrozooids with four or five short tentacles; dactylozooids

can be entirely retracted. Ampullae prominent, scattered, in male and female; male gonophore with branching spadix, several in each ampulla; female gonophore solitary in each ampulla.

This description differs from MOSELEY's in two particulars. It has been found that the gastropores or dactylopores are in many species regularly arranged. For example the dactylopores in *E. glabra* (Pourtales) are placed in a row upon both of the lateral sides of the branches, and in *E. ramosa* the gastropores always occur singly, at the angles of the branches and chiefly on the anterior surface. MOSELEY gives four as the number of the tentacles of the gastrozooid. This is not quite a constant number, as in one branch of *E. ramosa* that was examined the gastrozooids had either four or five tentacles.

We have also added a note on the contents of the male ampullae.

This is a deep sea genus of wide distribution. The following are the depths at which the various species have been found:

E. pourtalesii Dall.	50—100 fms.	*E. carinata* Pourtales.	270—292 fms.
E. labiata Moseley.	90—600 fms.	*E. aspera* Gray.	depths not recorded.
E. glabra Pourtales.	100—558 fms.	*E. fissurata* Gray.	depths not recorded.
E. cochleata Pourtales.	154—292 fms.		

The two new Siboga species occurred at:

E. ramosa 283 fms. (520 M.) *E. horrida* 605 fms. (1089 M.)

Geographically the species have been found as follows:

Pacific Ocean.	Atlantic Ocean.	
E. pourtalesii.	*E. carinata.*	*E. dabneyi.*
E. ramosa.	*E. cochleata.*	*E. labiata.*
E. horrida.	*E. glabra.*	*E. regularis.*

E. fissurata is recorded from the Antarctic Ocean.

1. *Errina ramosa* sp. n. Plate II, figs. 18 and 19.

Stat. 297. 10° 39′ S., 123° 40′ E. Between Timor and Rotti. 520 M. Several pieces, not all of one colony.

This species forms a delicate, subflabellate coenosteum the branches of which have a tendency to be dichotomous, as is the case in other species of the genus. The branches do not anastomose. The height of the largest colony is about 60 mm., the spread 80 mm. The colour is white. The surface is very irregular on the younger branches, owing to the projecting dactylopores, between which are longitudinal grooves. At the bottom of these grooves are the pores of the coenenchym, which in the older branches are more or less slit-shaped. When calcined it can be observed that the whole surface is also covered with granulations, or very minute closely-placed spines. The gastropores occur singly at the angles of the branches, chiefly on the anterior surface. They appear first as a shallow circular pit, (Fig. 19 y. gast.) with the style in the centre (at right angles to the axis of the branch); then the pit deepens and the edges

are slightly raised, later the abaxial edge grows very much more than the rest so as to form a scale which finally covers over the gastropore. The scale may bear one or more dactylozooids. The gastropores are 0,4 mm. in diameter. The dactylopores occur on small nariform projections (whose aperture is always towards the apex of the branch) all over the surface of the coenosteum but often in greater numbers along the sides of the branches, than on either surface. The projecting part is soon worn down in the older parts of the branches. The ampullae which are smooth, except for what are apparently partially closed up dactylopores, occur on both surfaces and sometimes on the sides of the branches, but chiefly on the "anterior" surface. The ampullae are often placed at the base of a gastropore scale.

On some of the branches smooth spherical galls occur perforated by 5 or 6 round pores. When fully formed these galls are 1,5 mm. in diameter. One of these when broken open was found to contain a curious Copepod which has been sent to Mr SCOTT for examination and is probably new to science.

This species closely resembles *E. glabra* (Pourtales) in size and method of growth, and in the shape and position of the gastropores. The dactylopores of *E. glabra* are however arranged in a row along each side of the branch, instead of more or less irregularly all over the surface. In the arrangement of the dactylopores, *E. ramosa* is more like *E. carinata* (Pourtales), but differs from it in having a gastropore scale.

The species may be defined;

Hydrophytum subflabellate, ramose, delicate; gastrozooids at the bases of branches, with a large scale bearing dactylozooids; dactylozooids also scattered all over the corallum on small projections.

2. *Errina horrida* sp. n. Plate II, figs. 20 and 21.

Stat. 150. 0°6′ N., 129°7′.2 E. Djilolo Passage. 1089 M. Three pieces.

This species forms a fairly robust, irregular, non-anastomosing flabellum. The most perfect specimen — one that had the base of attachment intact, although the terminal branches were broken — was probably about 60 mm. in height. The main stem, which almost immediately divides into two branches, is 6 mm. in diameter, the axis at the base of the terminal branches 0,8 mm. in diameter. The colour of the specimens is a pale brownish yellow, lighter on one side than on the other. The surface of the coral is similar so that of *E. ramosa*, but the minute spines are rather larger and run in more definite longitudinal rows. Dactylopores are scattered all over the surface, even upon the ampullae. The abaxial edge of these pores projects so as to form a nariform process. They are decidedly larger and more numerous than in *E. ramosa*. The young gastropores closely resemble the dactylopores, only they are larger and deeper (they may be 1,4 mm. long, even when young) and have the usual pointed hirsute style. A branch generally develops below each gastropore, so that when the pores are older they are always to be found in the angles of branches. The coenosteum being flabellate, the branchlets are only formed along the two sides of the branches and therefore when the gastropores occur on the surface of the flabellum they are not protected by a branch; they

have however a slight scale. The gastropores are round or oval and have a diameter of 0,3 mm.; the style grows to a great size in old pores. The gastrozooid has four or five tentacles. The ampullae are large and prominent and often bear ridges in addition to the verrucae of the dactylozooids. The female ampullae are 1,2 mm. in diameter. No male specimens were observed.

This species seems to be most closely allied to *E. carinata* (Pourtales), but the latter is distinguished by having all the gastropores on one surface.

The species may be defined;

Hydrophytum subflabellate, ramose; gastropores in the angles of the branches without a scale, less frequently on the surface with a slight scale; dactylozooids scattered, forming prominent verrucae.

Distichopora Lamarck.

1. *Distichopora violacea* Milne Edwards and Haime.

MILNE EDWARDS and HAIME. Hist. Nat. des Cor. V, III, p. 451.

Stat. 152. N.W. of Waigeu Isl. Dredge and reef exploration. Up to 32 M. 1 Ex.

A young colony 17 mm. high, growing in two parallel flabella. The colour is violet, white towards the apices of the branches.

Cryptohelia Milne Edwards and Haime.

MILNE EDWARDS and HAIME. Hist. Nat. des Coral, p. 127.
MOSELEY. Chal. Zool. Vol. II, p. 98.

The genus may be defined as follows: Coenosteum arborescent, flabelliform. Pores in regular cyclosystems only; cyclosystems turned towards one surface of the flabellum; styles absent in gastropore and dactylopore; gastropore divided into two chambers, upper and lower; the opening between the two is circular. Gastrozooids without tentacles; dactylozooid partially retractile only. Ampullae in connexion with the cyclosystems, usually prominent; several female and numerous male gonophores in each ampulla; the male gonophore without a spadix: Sterrula larva long and vermiform.

Cryptohelia is a deep sea genus of wide distribution. The following are the depths at which it has been found:

C. pudica Milne Edwards and Haime.	Depth?
C. pudica from the Siboga Collection.	1300—1633 M.
C. moseleyi (*C. pudica* Moseley, specimen figured).	1525 fms. (= 2745 M.).
C. piercei Pourtales.	267—600 fms. (= 471—1050 M.).
C. japonica (*Endohelia japonica* M. E. & H.).	Depth?

The Siboga new species are:

C. ramosa	1165—1264 M.	*C. balia*	1300—1633 M.
C. pachypoma	1089 „	*C. stenopoma*	1300—1633 „
C. platypoma	469 „		

Geographically the species have been found in:

Pacific Ocean.		Atlantic Ocean.
C. pudica.	*C. platypoma.*	*C. moseleyi.*
C. japonica.	*C. balia.*	*C. piercei.*
C. ramosa.	*C. stenopoma.*	
C. pachypoma.		

1. *Cryptohelia pudica* Milne Edwards and Haime.

MILNE EDWARDS and HAIME. Ann. des Sc. Nat., 3ième ser., t. XIII, p. 93, pl. 3, fig. 1, 1850. Histoire Nat. des Coralliaires, t. II, p. 127. New Guinea.

Stat. 177. 2° 24′.5 S., 129° 38′.5 E. N. of Ceram. 1633—1300 M. Several fragments.
Stat. 150? 0° 6′ N., 129° 7′.2 E. Djilolo Passage. 1089 M. One fragment.

The Siboga material of this species came from about the same locality as the type specimens; but, unfortunately, MILNE EDWARDS does not give the depth at which his specimens were found. The peculiarities of this species are its robust growth, the large size of the cyclosystems, the large broad lid, which completely covers the cyclocystem and the long but shallow septa. The ampullae, which are not mentioned by MILNE EDWARDS, occur as swellings at the base of the lid. The cavity of the ampulla does not extend beneath the cyclosystem.

It does not seem to us that MOSELEY's *C. pudica* is the same species as the one described by MILNE EDWARDS. The shape of the cyclosystems and their relation to the stem that bears them is different. In MOSELEY's specimens the cyclosystems are not raised above the surface of the coral or isolated from it, though the branches swell locally where they are situated. In MILNE EDWARDS' specimens the cyclosystems are stalked and the septa do not quite extend to the edge. The lids are also different, being much smaller. The proportions of the lids are not the same, they are not so broad in MOSELEY's specimens. In MOSELEY's specimens also the female ampullae occur on either side of the cyclosystems, while in our specimens, which are evidently identical with those of MILNE EDWARDS they occur as swellings at the base of the lid. It appears to us therefore that MOSELEY's specimens do not belong to the same species as those described by MILNE EDWARDS and we propose to constitute a new species for them called *Cryptohelia moseleyi.*

2. *Cryptohelia ramosa* sp. n. Plate II, fig. 22 and 23.

Stat. 122. 1° 58′.5 N., 125° 0′.5 E. N.E. of Celebes. 1165—1264 M. 4 fragments of one colony.

This species forms a large and many branched flabellum with a height and breadth of about 75 mm. The branches do not anastomose. The base of the main stem is 3 mm. in diameter; the axis at the base of the terminal branches about 1 mm. The corallum is of a yellowish white colour. When calcined the usual longitudinal striations, into which the coenenchym canals open are more clearly visible, the whole surface is also seen to be granulated, owing to the presence of minute spines which are arranged more or less in transverse rows, giving a slightly rough appearance. The cyclosystems, which are oval, with a long diameter of 1,6 mm.

or rather less and about 1 mm. apart, have well developed lids which completely covers them. The main stem is devoid of cyclosystems along its lower half; they have been obliterated by rapid growth of the coenenchym; their previous situation is indicated by slight swellings. The ampullae occur on the lid. (Males only were found). Their growth swells the lid considerably, so as to make it dome-shaped; the surface is smooth (Fig. 23, l. 1). The roof or upper part of the dome breaks away when the spermatozoa are sufficiently ripe. In two cases where the lid has either been broken off at a very early stage, or else is abortive, the ampulla is formed at the region from which the lids usually spring. This species is most closely allied to the one next described. *C. pachypoma.*

The species may be defined:

Hydrophytum flabellate; surface smooth; cyclosystems oval, lids broad, generally rather larger than the cyclosystems they cover; ampullae on lid, surface smooth, distribution of male gonads by the breaking away of the upper half of the lid.

3. *Cryptohelia pachypoma* sp. n. Plate III, figs. 24 and 25.

Stat. 150? 0°6′ N., 129°7′.2 E. Djilolo Passage. 1089 M. 4 pieces.

This very pretty species forms an irregular flabellum, with non-anastomosing branches. The main stem and principal side branches are stout (3,7 mm. is the greatest diameter of the main stem), but the younger branches, which are numerous and closely placed, are very delicate, the stem at the base of a terminal branch being sometimes not more than 0,6 mm. The total height and breadth of the colony is about 40 mm. The colour is a pale yellowish white. The surface is scattered over with small perforated tubercles (Fig. 25 nem.); these occur especially on the posterior surface and on the sides, also often along the edge or surface of the lid and upon the ampullae: they are nematophores. Otherwise the surface appears to be smooth until it is calcined, when shallow, longitudinal grooves become apparent. The coenosteum between these is seen to be transversely striated. The cyclosystems are circular or nearly so, with a diameter of about 1,4 mm. and are generally about 0,6 mm. apart. They are obliterated on the thickest parts of the stem. In one or two cases there is a small group or a solitary cyclosystem on the anterior instead of the posterior surface of the flabellum. The ampullae occur upon the lids of the cyclosystem. Their formation is followed by great increase in size, so much so that adjacent lids sometimes coalesce. The specimens obtained were males. Three ampullae are usually formed on each lid, one towards the base and two further forward. This and the perforated tubercles already mentioned, give the ampullae a very nobbly appearance. In one or two cases where the lid has not been formed or has broken off at a very young stage, the ampullae have been formed at the base of where the lid would have been. The male gonads are not distributed by the breaking away of the upper half of the lid, as in *C. ramosa*, but as the stalk of attachment of the lid is not strong and the lid itself very bulky, the lid easily becomes detached as a whole and the spermatozoa escape.

This species is most nearly allied to *C. ramosa* in the position of the ampullae but is distinguished from the latter by the smaller size of the colony, the round shape and smaller size

of the cyclosystems, finer terminal branches, cyclosystems more crowded and the presence of perforated tubercles on the surface and in the different method of distributing the spermatozoa.

The species may be defined;

Hydrophytum irregularly flabellate; with scattered perforated tubercles on the surface; cyclosystems round with a large lid bearing perforated tubercles; lids closely crowded; ampullae upon the lid.

4. *C. platypoma* sp. n. Plate III, figs. 26 and 27.

Stat. 156. 0° 29'.2 S., 130° 5'.3 E. N.W. of New Guinea. 469 M. 1 Ex.

This is a small, irregularly flabellate species, with non-anastomosing branches. The colony was probably about 20—25 mm. in height, the base of the main stem is 2 mm. in diameter. The longitudinal striations are even less marked than in the preceding species: fine transverse striations are also present. The colour is yellowish white. The cyclosystems are oval and are on an average 0,88 mm. by 0,66 mm. There are usually only 7 or 8 septa. This small number is partly due to the presence of a very broad lid. This lid is however not long and does not usually completely cover the calicle. There is no external evidence of ampullae, although it cannot be a very young colony as several old cyclosystems have been covered up by coenenchym. This species approaches nearest to *C. piercei* (Pourtales) which occurred off Havanna, Sombrero Lighthouse and Bahia Honda. But although, *C. piercei* is of about the same height, the cyclosystems are more than twice as large, being 2 mm. in diameter: the lid also is not so extensive.

C. platypoma comes from a depth of 469 M., which is shallow water for a *Cryptohelia*, the only other species of this genus recorded from a similar depth is *C. piercei*.

The species may be defined;

Hydrophytum irregularly flabellate, cyclosystems small, oval, with 8 septa and a short broad lid.

5. *Cryptohelia balia* sp. n. Plate III, figs. 28 and 29.

? syn. *Endohelia japonica* Milne Edwards and Haime. Hist. Nat. d. Cor. t. II, p. 128.

Stat. 177. 2° 24'.5 S., 129° 38'.8 E. N. of Ceram. 1633 to 1300 M. One young colony and 4 fragments of older ones.

This is a subflabellate, more or less encrusting species, the branches sometimes adhering to the objects it grows upon by a thin lamina produced from the under surface. The branches may anastomose. It is curiously irregular in growth, cyclosystems sometimes appearing on the posterior, instead of the anterior surface of the corallum. The colour is white. The surface is longitudinally striated and granulated, the granules sometimes being arranged irregularly or disposed in rows so as to give the usual appearance of transverse striations. Large nematophores are scattered over the surface (Fig. 29 nem.). They appear in dried or calcined specimens as pits with slightly raised edges; they may be as much as 0,1 mm. in diameter. The cyclosystems are round and about 1,6 mm. in diameter. The edge of each cyclosystem is slightly crenate

when young. The lid is triangular in shape and thick but small; it may bear nematophores. The ampullae appear as slight swellings at the base of the lid: their surface is smooth. These ampullae were female: no males were found.

There are some points of resemblance between this species and the imperfectly described *Endohelia japonica* of MILNE EDWARDS and HAIME, but in the present state of knowledge we think it advisable to keep the Siboga species distinct.

The species may be defined;

Hydrophytum subflabellate, branches occasionally anastomosing; large nematophores on stem and lid; lid small, thick, triangular; ampullae at base of lid.

6. *Cryptohelia stenopoma* sp. n. Plate III, figs. 30, 31 and 32.

Stat. 177. 2° 24'.5 S., 129° 38'.5 E. N. of Ceram. 1633 to 1300 M. One young colony.
Stat. 226. 5° 26'.7 S., 127° 36'.5 E. Banda Sea, between Lucipara and Schildpad Ils. 1595 M. Two fragments, dry.

This is a partially encrusting species. It is subflabellate and the branches of the small specimens at our disposal do not show any signs of anastomosis. The colour is yellowish white. The surface is marked by pronounced longitudinal and fine transverse striations and bears a few scattered, small nematophores, situated in pits with slightly raised edges. The cyclosystems are round and in a young colony their average diameter is 1,2 mm. and in an old one 1,6 mm. The edge of the cyclosystem is exsert and deeply crenate. The lid is small, narrow and thin, the two sides slightly reflected upwards. The lid has the appearance of having been formed from only one septum, not from several, as seems to be the case when there is a broader base. It also appears in this species to be a comparatively new formation, the septum which forms the lid, projecting as far towards the centre of the gastropore as the other septa. When the lid is broken off, the lid septum can only be distinguished from the others by being rather thicker. At the base of the septa of young cyclosystems, there may be nematophores, similar to those described by MOSELEY in the same genus. The calicles are from 1,2 to 1,6 mm. apart. The ampullae are represented in the specimens from Stat. 226 by a swelling running all round the cyclosystem or on the two lateral sides only and causing in the latter case considerable distortion of their usual form. This swelling contains small cavities and is consequently probably a male (Fig. 32). Unfortunately the only specimens showing this kind of ampullae were dried and further information as to their structure could not be obtained. One cyclosystem only in the small colony from Stat. 177, showed a young ampulla behind the cyclosystem, this was probably a female (Fig. 31).

This species is allied to *C. balia* in the size of the lid and encrusting method of growth. In *C. balia* however the lid is much more massive and bears the characteristic, large nematophores. The nematophores are much smaller in *C. stenopoma*. The edge of the cyclosystem in *C. stenopoma* is much more deeply crenate, whereas in *C. balia* the edges of the old cyclosystems are not crenate at all. Though the female ampullae are situated behind the cyclosystem in both species, their appearance is different, those of *C. balia* being scarcely noticeable on the surface. Until further evidence is obtained the two species may be considered distinct.

The species may be defined;

Hydrophytum subflabellate; nematophores on stem and septa; lid small, thin and narrow; edge of cyclosystem exsert and crenate; ampullae round, or on the two sides of the cyclosystem in the male, at the base of lid in the female.

Conopora Moseley.

MOSELEY. Chal. Zool. Vol. II, p. 97.

The genus may be defined:

Coenosteum arborescent, not flabelliform. Pores in regular cyclosystems only, their apertures turned in all directions; styles absent in gastropores and dactylopores; gastropore with two chambers upper and lower, which are separated by a circular opening. Gastrozooids and dactylozooids connected by a broad canal (fig. 35).

Ampullae occur in the male as a slight swelling around the cyclosystems; very numerous gonophores in each ampulla. Female ampullae unknown.

C. tenuis Moseley and *C. major* from this collection, are the only two species of the genus. The type specimen of the former occurred off the Kermadec Ils in 520 fms. (936 M.). The same species was found by the Siboga in 469 M. off New Guinea. The new species *C. major* was found a depths of 204 and 1901 M. off Kei islands and N.E. Celebes.

1. *Conopora tenuis* Moseley.

MOSELEY. Chall. Zool.: Vol. II, p. 97 and 82. Hydrocorallines. Pl. XII, figs. 5, *a*, *b* and 6. Off Kermadec Ils. 520 fms.

Stat. 156. 0° 29'.2 S., 130° 5'.3 E. N.W. of New Guinea. 469 M. 3 Ex. 1 dead.

The three colonies are all about 20 mm. in height. The cyclosystems are usually 0,8 mm. in diameter. The ampullae, which were not described by MOSELEY, occur in the male as slight swellings round the base of the cyclosystems. No female colonies were found.

Colony not flabellate; 20 mm. in height; main stem stout, hollow, fistulose and coalescing, inhabited by a polychaet worm; cyclosystems 0,8 mm. in diameter, ampullae as swellings round the cyclosystems.

2. *Conopora major* sp. n. Plate III, figs. 33, 34 and 35.

Stat. 251. 5° 28'.4 S., 132° 0'.2 E. Kei Ils. 204 M. Two colonies and one fragment.
Stat. 119. 1° 33'.5 N., 124° 41' E. N.E. Celebes. 1901 M. Two examples, one dead.

This species is closely allied to *C. tenuis*, in the general method of growth, but is not so delicate as the latter. The height and breadth of the two most complete colonies are 30 × 20 mm. and 35 × 15 mm. respectively. The hollow central stem, inhabited by a polychaet worm, is about 7 mm. in diameter near the base. The branches occasionally coalesce and arise irregularly from the surface of the main stem, though in one colony there is a slight indication of flabellate growth, owing to the branches being rather longer on two, opposite,

sides of the coral. The branches do not exceed 10 mm. in length; they do not branch much, when they do it is often dichotomous; the diameter at the base of a terminal branch is 1,2 mm. The colour is white, the surface smooth except for the usual pits made by the terminations of the canals which are irregularly scattered on the main stem and arranged so as to form longitudinal striations on the younger branches. The cyclosystems have a diameter of 1,2 mm. They are round or irregular in shape. The ampullae occur as swellings round the base of the cyclosystem. Male ampullae only were found (Fig. 34 and 35).

This species is closely allied to *C. tenuis*, the chief difference being the larger size and stouter growth of the colony of *C. major* and the larger size of its cyclosystems.

The species may be defined:

Hydrophytum not flabellate, 30 mm. in height; main stem stout, hollow, fistulose and coalescing, inhabited by a polychaet worm; cyclosystems 1,2 mm. in diameter; ampullae as swellings round the cyclosystems.

Steganopora gen. nov.

Plate III, figs. 36, 37 and 38.

This genus differs greatly from all other genera of the Stylasteridae in having the zooids, both gastrozooids and dactylozooids, in very close communication by short, broad canals. In other Stylasterids, the only connexion which exists between the zooids is the coenosarcal net-work of canals. *Conopora*, however, is a partial exception, the dactylozooids being closely connected with the gastrozooid by short broad canals. The gastrozooids and dactylozooids in Steganopora are very long and penetrate very far down the stem (Fig. 38). In consequence of the close proximity of the zooids, each zooid has not a separate and distinct pore; there is no true base to it and consequently there are no styles. The gastropores are without a scale and lie concealed among the long, tubular dactylopores, which give the surface a very spiny appearance. A spadix is present in the male gonophore. There are several gonophores in each ampulla.

1. *Steganopora spinosa* sp. n. Plate III, figs. 36, 37 and 38.

Stat. 150. 0° 6′ N., 129° 7′.2 E. Djilolo Passage. One fragment.

Unfortunately only a very small fragment, 15 mm. in length, was obtained. There are no side branches. The diameter of the base of the stem is 2,5 mm. The colour is white. The surface of the coral, between the zooid pores appears smooth until it is calcined, when small irregularly scattered pores of the coenenchym network appear. The gastropores are round or rather irregular in shape and about 0,3 mm. in diameter. The dactylozooids are numerous and irregularly placed. They are situated in tubular pores which project upwards and outwards. They vary in size; the largest are about 1,2 mm. in length. The ampullae occur all over the surface of the coral.

Externally this species resembles *Spinipora echinata* (Moseley) but the likeness is only superficial, the character of the canal system and dactylozooids being in no way similar. The gastrozooids of *Steganopora* also differ from those of *Spinipora* in having no style.

DESCRIPTION OF PLATES

Abbreviations.

amp. = ampulla. sp. = spine. spo. = sponge. dac. = dactylozooid. st. = style. dac. p. = dactylopore. gast. p. = gastropore. y. gast. = young gastropore. gast. sc. = gastropore scale. coen. p. = pore of the coenosarc canal system. n. cyc. = new cyclosystem. nem. = nematophore.

PLATE I.

Fig. 1. *Stylaster eximius* fac. *altus*. × $1^1/_2$. Part of a colony. Specimen crowded with ampullae (amp.).

Fig. 2. *Stylaster eximius* fac. *altus*. × 20. Showing the side view of the small kind of cyclosystem.

Fig. 3. *Stylaster eximius* fac. *altus*. × 20. Drawn after calcining the coral. Superficial view of the same cyclosystems, showing the completion of the cycle of dactylozooids.

Fig. 4. *Stylaster eximius* fac. *dentatus*. × 2. Part of a very old colony, the surface of which shows crowded tuberculate prominences — the ampullae.

Fig. 5. *Stylaster eximius* fac. *dentatus*. × 23. The extremity of a branch from the same, showing ampullae (amp.).

Fig. 6. *Stylaster eximius* fac. *dentatus*. × 2. A young colony. The surface is much smoother than in the previous specimen, owing to the relative scarcity of the ampullae. A sketch of a magnified branch of this facies would closely resemble Fig. 5.

Fig. 7. *Stylaster eximius* fac. *minor*. × 2. Part of a white colony. One of the side branches has grown against a sponge (spo), forming a thin layer over its surface. The pink colonies of this facies are usually more regularly flabellate, than the white ones.

Fig. 8. *Stylaster eximius* fac. *minor*. × 20. A small portion of the pink variety, showing ampullae (amp.) and spines (sp.) on stem and ampullae (probably ♀).

Fig. 9. *Stylaster bilobatus* sp. n. × 2. A fragment. Pink variety. Showing ampullae (amp.) at the base of many of the cyclosystems.

Fig. 10. *Stylaster bilobatus* sp. n. × 20. White variety. Showing the bilobed character of the cyclosystems. Some specimens are thickly covered with smaller spines.

Fig. 11. *Stylaster multiplex* sp. n. × 2. Whole colony. Showing the arrangement of the branches in several parallel planes.

Fig. 12. *Stylaster multiplex*. × 17. Showing the cyclosystems inclined towards one surface and ampullae on both surfaces, always near a cyclosystem, and dactylozooids (dac.) partially contracted. gast.p. = gastropore broken across; it is deep.

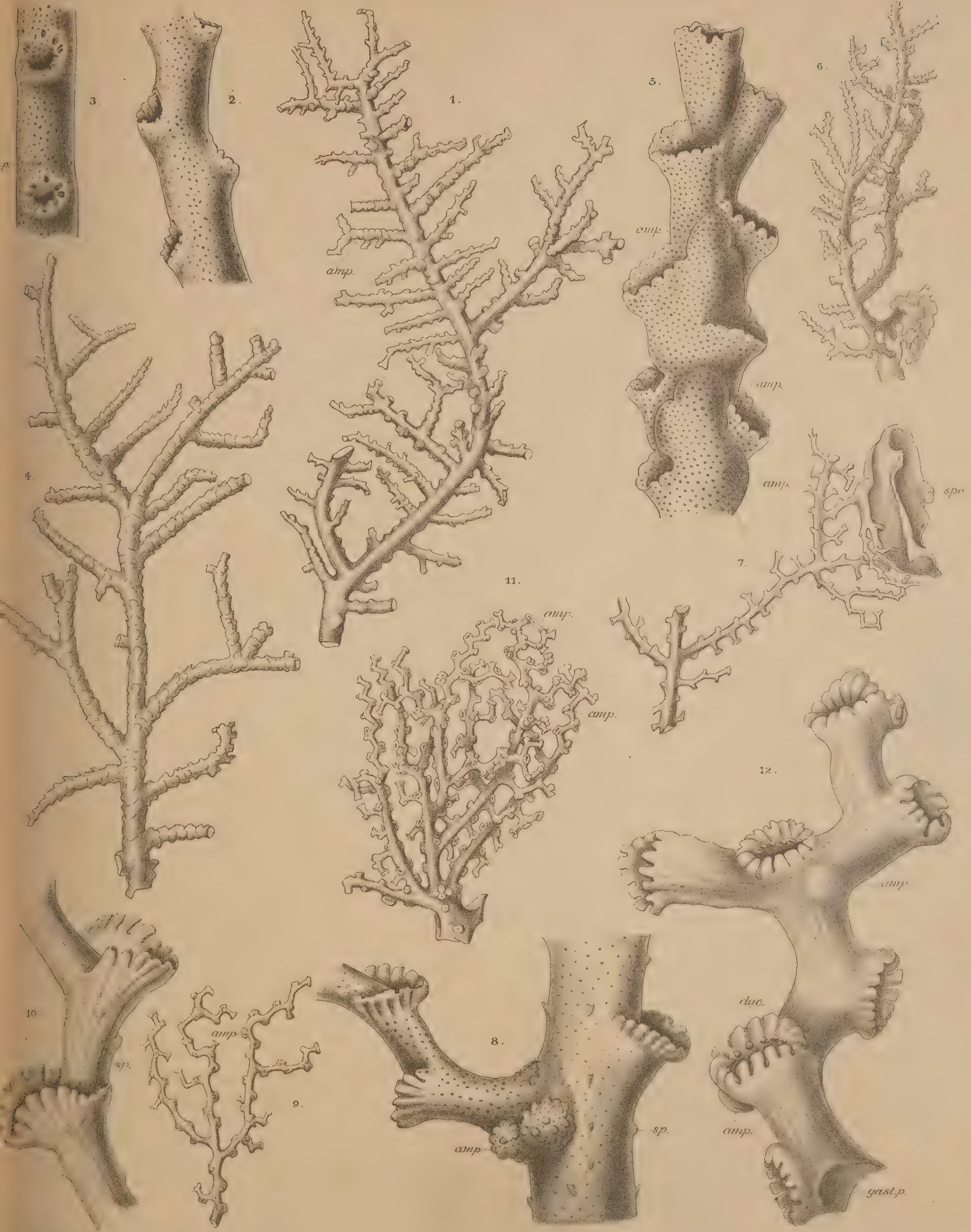

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PLATE II.

Fig. 13. *Stylaster minimus* sp. n. × 3. The only specimen: a fragment. Cyclosystems all on one surface.

Fig. 14. *Stylaster minimus.* × 23. Calcined. The gastropore is so shallow, that the style (st.) is visible, it is not however in the centre of the pore.

Fig. 15. *Stylaster tiliatus* sp. n. × $1^1/_2$. Whole colony as seen from the anterior side upon which all the cyclosystems are situated. The gastropore is very deep.

Fig. 16. *Stylaster umbonatus* sp. n. × 3. Part of a colony. Showing all the cyclosystems upon one surface.

Fig. 17. *Stylaster umbonatus* sp. n. × 20. Showing ampullae and the characteristic large, blunt spines of the species. The gastropore is deep.

Fig. 18. *Errina ramosa* sp. n. × $1^1/_2$. Part of a colony. Slightly reconstructed. Showing ampullae (amp.) and the dichotomous method of growth.

Fig. 19. *Errina ramosa.* × 15. Terminal branch with two male ampullae (amp.), each situated behind a gastropore scale (gast. sc.); the two are not always closely associated, but the gastropore is always at the base of a branch and usually on one surface. Side branchlet, with young gastropore (y. gast.), scale not yet developed. The style is indicated. Dactylopores on nariform projections all over the surfaces of the branches, even upon the gastropore scales.

Fig. 20. *Errina horrida* sp. n. × 2. The greater part of a colony: the ends of several branches are broken off.

Fig. 21. *Errina horrida.* × 15. Part of a branch showing the scaleless gastropores (gast. p.) in different stages of development and four female ampullae. Y. br. = young branch. The dactylopores are upon nariform projections all over the surface.

Fig. 22. *Cryptohelia ramosa* × $1^1/_2$. Slightly reconstructed.

Fig. 23. *Cryptohelia ramosa.* × 20. Two cyclosystems, one lid (l. 1.) bearing ♂ ampullae (amp.), the other (l. 2.) is much thinner, owing to the upper part of the lid, including the ampulla, having been sloughed off. The dactylozooids (dac.) are visible; they are not capable of much contraction.

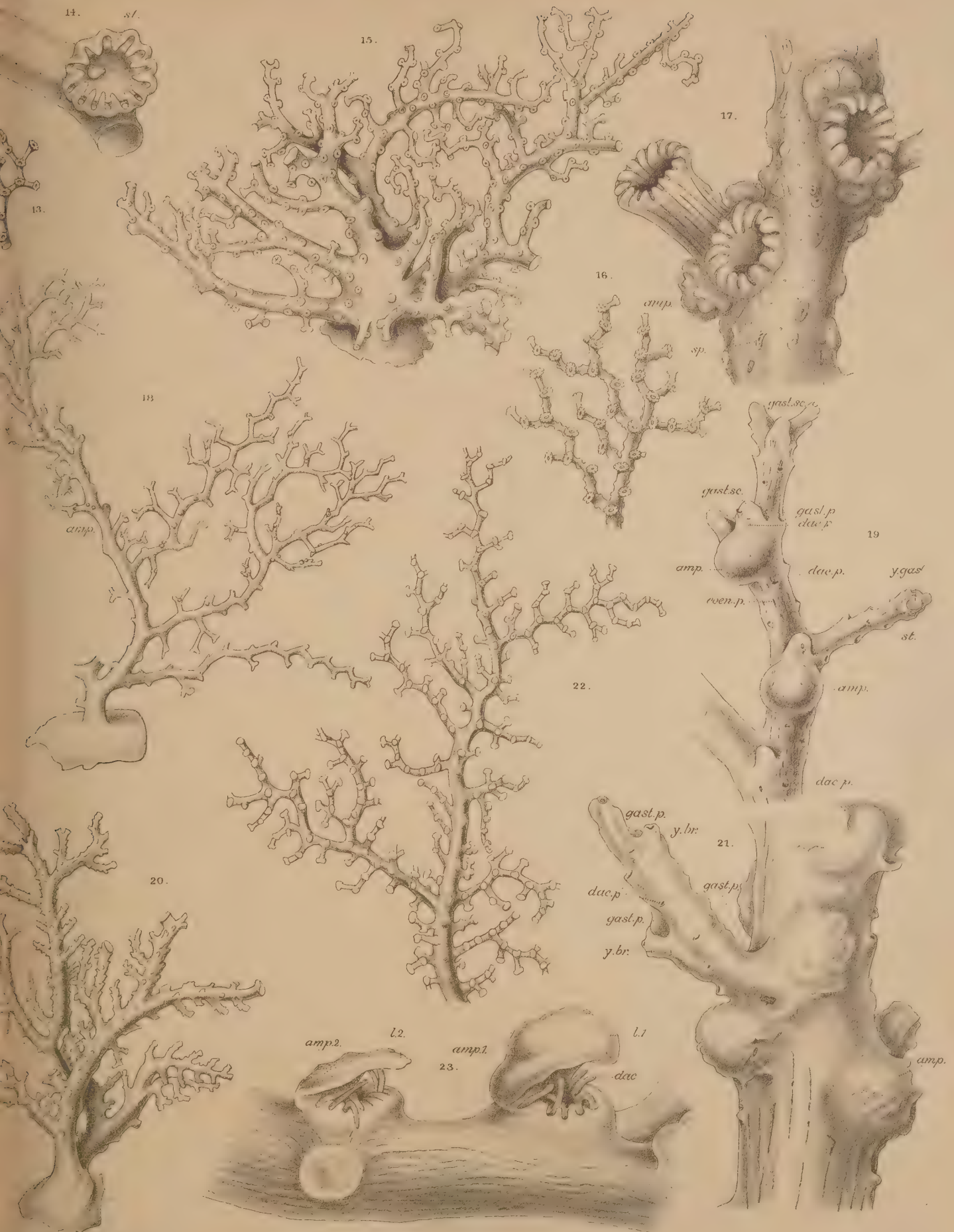

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PLATE III.

Fig. 24. *Cryptohelia pachypoma* × 2. A branch, probably the greater part of a colony. All the lids that are present are distended with male ampullae. Two cyclosystems are joined together by their lids (j.).

Fig. 25 *Cryptohelia pachypoma* × 21. Showing the very large lids bearing male ampullae, usually from 1 to 5 in each lid. Owing to their size the lids are frequently detached, and their contents scattered. Nematophores (nem.) are on the ampullae and stem.

Fig. 26. *Cryptohelia platypoma* sp. n. × 2. Part of a colony.

Fig. 27. *Cryptohelia platypoma.* × 21. Showing the great breadth of the lid (l. i. and l. 3) and the small number of septa. At l. 2 the lid has been broken off.

Fig. 28. *Cryptohelia balia* sp. n. × 2. Slightly reconstructed. Probably the greater part of a colony. Showing incrusting laminae (lam.).

Fig. 29. *Cryptohelia balia.* × 17. Two cyclosystems showing the substantial, triangular lid, one cyclosystem with the ampulla broken open (amp. 1) as it was found, the other with it intact (amp. 2). The ampullae are probably female. The nematophores (nem.) are very large.

Fig. 30. *Cryptohelia stenopoma* sp. n. × $2^1/_3$. Part of a young colony.

Fig. 31. *Cryptohelia stenopoma.* × 21. A branch from the colony shown in Fig. 30, showing the small delicate lids. One cyclosystem with a young (probably ♀) ampulla.

Fig. 32. *Cryptohelia stenopoma.* × 20. Dried specimen calcined. Cyclosystem with ampullae, showing also the exsert septa.

Fig. 33. *Conopora major.* × 2. Whole colony, with symbiotic polychaet (pol.). Pore (ho.) leading into the hollow interior of the very thick main stem. The growth is irregular and not flabellate.

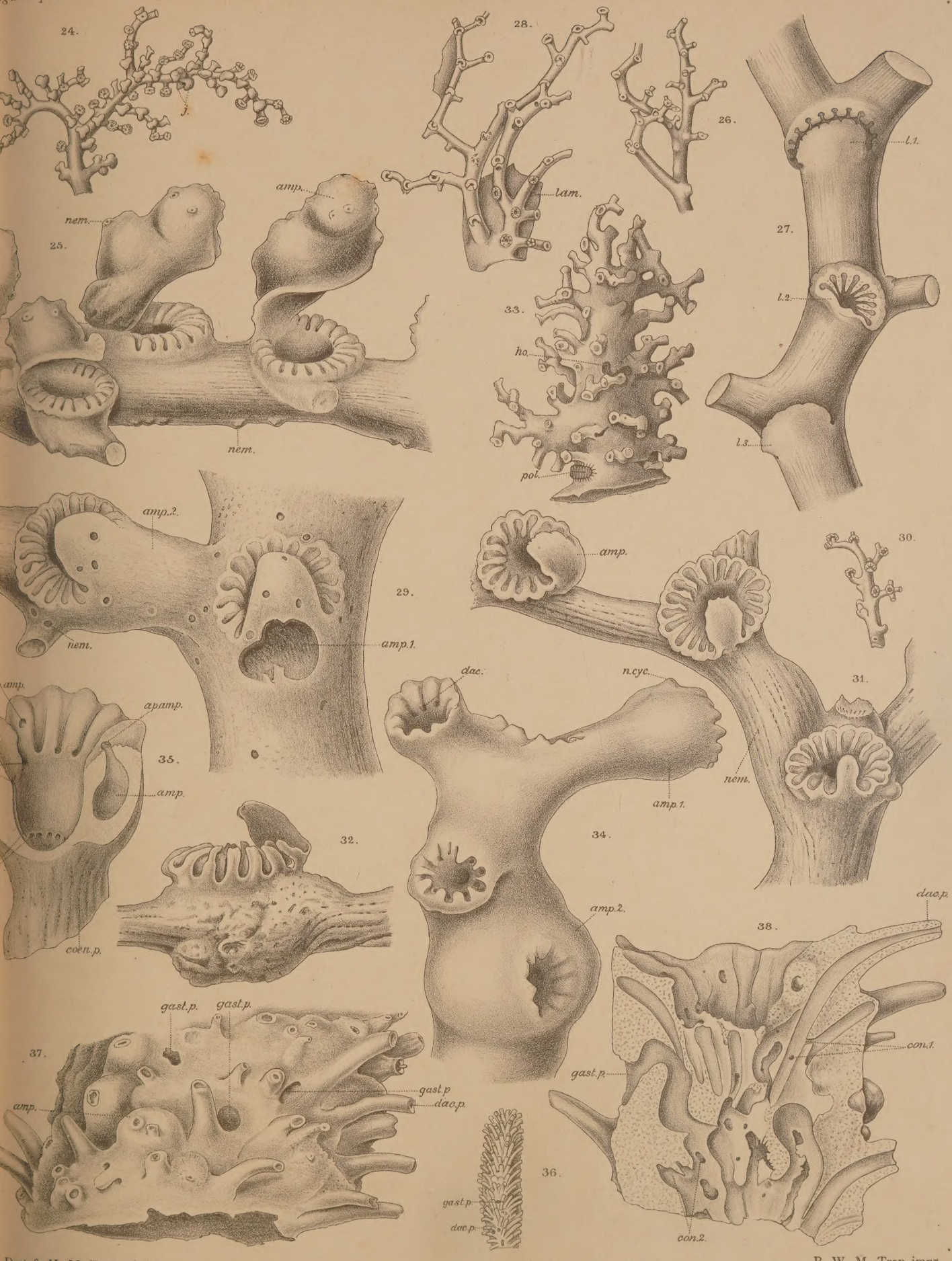
Fig. 34. *Conopora major.* × 18. Showing two stages in the formation of the circular male ampulla (amp. 1 and amp. 2). At amp. 1 it is a slight swelling, at amp. 2 it encircles the cyclosystem like a girdle. Each swelling contains several cavities in which the gonads are developed. The surface in fresh specimens appears smooth.

Fig. 35. *Conopora major.* × 22. One cyclosystem calcined and cut longditudinally so as to show an ampulla cavity. These cavities have each a permanent aperture (ap. amp.) upon a septum. The pores called lower dactylopores (l. dac. p.) indicate the position of the connection between the dactylozooids and the gastrozooid, as described by MOSELEY, nem. = nematophore, often present on the septa.

Fig. 36. *Steganopora spinosa.* × 2. Terminal part of a branch, the only specimen. It is thinner at the base owing to the absence of ampullae.

Fig. 37. *Steganopora spinosa.* × 19. Showing tubular dactylozooid projections, which are often broken short, gastropores and ampullae.

Fig. 38. *Steganopora spinosa* × 20. Longitudinal section through the basal part of the calcined stem where there are no ampullae. Showing the great length of dactylopores and the intercommunications between them (con. 1) and with the gastropores (con. 2).



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THE

SIPHONOPHORA OF THE SIBOGA EXPEDITION